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REPORT

ON THE

QUALITY OF THE WATER

FROM THE

PUMPS AND SURFACE WELLS

OF THE

CITY OF LONDON.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

BY
H. LETHEBY, M.B., M.A., Ph.D., &c.,
PROFESSOR OF CHEMISTRY IN THE COLLEGE OF THE LONDON HOSPITAL,
AND MEDICAL OFFICER OF HEALTH FOR THE
CITY OF LONDON.

LONDON:
M. LOWNDS, PRINTER, FENCHURCH STREET, CITY.
1866.

At a Meeting of the Special Sanitary Committee of the Commissioners of Sewers of the City of London, held at the Guildhall of the said City, on Friday, August 24th, 1866:—

The Medical Officer of Health for the City submitted the following Report.

It was Ordered—

To be printed, and a Copy sent to each Member of the Court, and of the Court of Common Council.

JOSEPH DAW,

Principal Clerk.

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To the Special Sanitary Committee of the Commissioners of Sewers of the City of London.

Gentlemen,

In consequence of the numerous applications lately made to me for information of the quality of the water supplied by the several pumps of the City, I think it necessary to report to you the average results of my numerous analyses of these waters during the last five years.

Altogether there are thirty-five pumps in the City from which the public are in the daily habit of drawing water for drinking purposes, and as you will perceive from the accompanying table the quantity of saline and organic matter in the gallon ranges from 26·63 grains to 129·73,—that of the New River during the last month being but 17·16 grains, and of the East London 18·18. Only six of the City wells yield water with less than 50 grains of solid matter in the gallon, and there are but two others with less than 70 grains. Ten of them contain from 70 to 80 grains per gallon, nine have from 80 to 90 grains, two have from 90 to 100 grains, and there are five wells in the City, namely those in Aldgate High Street, in Bishopsgate Street—by Dunning's Alley, in Leadenhall Market, in Milton Street, Cripplegate, and in St. Nicholas Olave Churchyard, the water of which contains from 100 to 130 grains of solid matter per gallon.

In most cases too, the constituents are remarkably indicative of the source and nature of the pollution. The wells of the public meat markets for example, as those of Newgate, Aldgate, and Leadenhall, are charged with the peculiar filth of those localities: indeed, the water furnished by the well in Leadenhall Market contains nearly 40 grains of common salt per gallon, besides a large quantity of nitre and organic matter, all of which is derived from the stinking serosity which runs from the hides, exposed for sale and salted upon the public way. The wells of the City churchyards and their neighbourhood are also strongly tainted with saltpetre and ammonia, the former to the extent of from 20 to nearly 30 grains in the gallon, and doubtless it is the final product of the decay of the animal matter buried in the neighbouring graveyards. Others of the public wells show the presence of the more or less oxidised products of substances which have escaped from adjoining drains and sewers; and nearly all of them are so largely impregnated with compounds which have percolated through the foul soil of the City that they are entirely unfit for domestic use. Where the soil is well protected and the pump is away from any especial source of pollution, as is the case with the two pumps at Guildhall, the water is but moderately tainted with impurities, but even there it is dangerous to use the water for drinking purposes, for there is no saying how soon it may become foul from a neighbouring sewer or cesspool.

I have already reported to you that as most of these waters are bright and sparkling, and have a cool and agreeable taste, they are much sought after for drinking purposes; but the coolness of the beverage, and the briskness of its appearance, are dangerous fascinations, for they are both derived from organic decay. In fact, the dead and decomposing matters accumulated in the soil, are partially changed by a wonderful power of oxidation, and thus converted into carbonic acid and nitre. These give to the water the agreeable qualities which are so deceptive; and although they are so frequently drank without any apparent manifestation of injury to health, yet it cannot be that the products of such corruption can be admitted into the human body without danger of insidious mischief; and at the present time there is the still greater danger of the impurities of the soil passing unchanged into the water, and being a source of quick and certain injury. In illustration of this it is hardly necessary to remind you of the remarkable outbreak of cholera which occurred in the Parish of St. James, Westminster, in the autumn of 1854, and which was traced to a favourite pump in Broad Street. It was noticed on that occasion that the disease was confined to a small area in the neighbourhood of the pump; and that of seventy-three persons who died during the first few days of the visitation, sixty-one had been drinking the water. It was even observed among persons who were living in the same street, and occasionally in the same houses, that those only were attacked who drank the favourite water of the pump. But more remarkable still, it was ascertained that persons who lived at a distance from the parish, and who had the water sent to them because of its supposed goodness, were seized with cholera and died. A full inquiry into all the circumstances the case proved that the well had become charged with cesspool drainage, and had thus acquired its poisonous action. The pollution had perhaps been going on for years, and yet the water had not betrayed it, until a slight excess of organic impurity brought out its dangerous properties. As in the case of most of the City wells, its cool and sparkling qualities, had gained for it such a high repute in the neighbourhood, that it was a favourite water, and was generally drank.

Another such a case occurred at West Ham, in Surrey, in the autumn of 1857. Suddenly at that place there was a visitation of cholera in a row of sixteen cottages that were apparently isolated from epidemic influences. It showed itself along one side of the street, where, in a few days, thirteen persons were attacked with the disease, seven of whom died. Dr. Elliott, the Health Officer for the district, suspected from his inquiries that the common pump on that side of the street had been concerned in the mischief: its water was therefore examined, and it was found to be polluted with the soakage from an adjoining sewer. At once the use of it was interdicted, and, to make the matter certain, the handle of the pump was taken away; and from that moment the further spread of the disease was arrested.

Again, I would remind you in illustration of this subject, that in the cholera visitations of 1848-9 and 1853-4, there were two striking examples of the influence of such water in the propagation of disease. The southern districts of London, comprising nearly a fifth of the population of the metropolis, were visited most severely with cholera at both of those outbreaks, and the persons who suffered most on each occasion, were those who drank the worst quality of water. The inhabitants were supplied by two rival companies, who obtained their water from the Thames at different parts of its course. In one case the water was charged with a larger amount of organic matter than in the other; and, although the conditions of the population were in every other respect the same, yet this had the effect of augmenting the mortality to a frightful extent. In the second visitation of the disease, the circumstances of the supply were changed: the water of the old company, which was formerly the worst, was now the best, and the severity of the disease was changed likewise; for those who partook of the still bad supply, suffered as before, and their mortality was three-and-a-half times greater than their neighbours, it being at the rate of 130 in the 10,000 instead of 37; and a similar tale may be told of the cholera visitation of many other places in this country.

All these are warnings to us of the danger of using water polluted with sewage, or the drainings from cesspools; nor are the percolations from the graveyards of a city less injurious, for experience has demonstrated that these also are a prolific source of disease. Let me refer to one instance only on the authority of Sir James Macgregor, who relates, that when the British army was in Spain, about 20,000 soldiers were buried in a rather small space of ground, and after two or three months, the troops who drank the water from the wells of the neighbourhood, were attacked with dysentery and malignant fevers. The cause of the mischief was clearly traced to the hardly recognisable impurity in the water from the shallow wells. Here, however, in the churchyards of this City, there are the remains of ten times such a buried army undergoing decay; and in the whole of the metropolis, in a space of not more than 218 acres, there were buried not long since as many as 50,000 dead in the year. In a generation of thirty years, this would give us a million and a half of decomposing bodies in the surface soil of London; and through this the water percolates, to find its way into the porous stratum which supplies the shallow wells of the metropolis. At best, the change of this corruption is but imperfect, for although the presence of ammonia and saltpetre tells us of an ultimate process of decay, yet it also indicates the more than possible danger which accompanies it.

All these considerations should force upon us the conclusion that water from the surface wells of the metropolis, contaminated as they are with the refuse of drains, and the soakings from grave-yards, is unfit for public use, and that no natural process of oxidation can render it safe. I advise, therefore, that none of the water furnished by the City pumps, nor by any of the pumps of London, should be used for domestic purposes.

I remain,

GENTLEMEN,

Your obedient Servant,

HY. LETHEBY.

GUILDHALL,
August 20*th*, 1866.

Composition of the Waters of the Pumps and Surface Wells of the City of London.

NAMES OF PUMPS.	Carbonate of Lime and Magnesia.	Sulphate of Lime and Magnesia.	Alkaline Chloride.	Alkaline Nitrate.	Silica and Alumina.	Organic and other Volatile Matter.	Total per Gallon.
	grs.	grs.	grs.	grs.	grs.	grs.	grs.
Aldgate	23·43	15·63	13·17	19·37	0·96	4·87	77·43
Aldgate High Street	25·30	24·30	20·70	24·20	1·12	8·13	103·75
Bartholomew Lane	21·70	16·17	15·47	16·50	0·97	4·56	75·37
Basinghall Street	21·17	25·20	12·73	13·60	0·97	6·30	79·97
Bell Yard, Gracechurch Street	19·29	12·80	19·11	19·58	1·00	8·22	80·00
Bishopsgate Church	22·60	21·20	18·20	17·33	1·10	6·23	86·66
Bishopsgate St., by Dunning's Alley	32·23	33·54	22·43	16·06	1·50	9·07	114·83
Bow Churchyard	25·80	19·13	18·47	12·87	1·00	5·43	82·70
Bowling Square	18·67	26·20	11·17	9·13	1·00	4·93	71·10
Bride Lane	14·53	23·07	25·53	24·27	0·93	6·87	95·20
Cannon Street West	14·80	13·73	10·87	25·53	1·00	5·10	71·03
Chequer Yard, Dowgate Hill	20·53	16·43	11·87	16·57	1·03	7·03	73·46
Cock and Hoop Yard, Houndsditch	19·93	17·33	13·03	21·90	1·00	5·60	77·79
Cornhill	22·13	18·20	10·70	16·23	1·20	5·37	73·83
Cree Church Lane	21·07	9·43	6·70	7·17	0·87	2·56	47·80
Fenchurch Street	21·77	20·23	14·50	21·33	0·87	7·23	85·93
Guildhall	12·90	8·65	4·30	3·05	0·95	2·90	32·75
Guildhall Buildings	13·37	4·40	3·40	2·76	0·60	2·10	26·63
Gutter Lane	16·57	15·53	7·47	10·53	0·97	5·33	56·40
Great St. Helen's	15·47	10·83	6·50	12·27	0·76	3·50	49·33
Half Moon Passage	16·40	13·00	17·23	15·00	0·87	3·50	66·00
Herald's College Yard	14·57	21·90	15·87	30·50	0·93	5·86	89·63
Honey Lane Market	16·10	10·50	9·23	6·63	1·10	3·27	46·83
Idol Lane	15·70	19·50	15·73	22·63	1·30	5·44	80·30
Ironmonger Lane	19·27	30·60	13·57	15·07	1·26	6·90	86·67
Leadenhall Market	16·63	23·97	38·60	29·13	1·07	5·53	114·93
Little Britain	25·27	29·93	13·83	6·42	1·43	8·27	85·17
Minories	21·93	21·70	15·46	29·00	1·23	6·63	95·97
Milton Street, Cripplegate	33·63	37·84	22·93	23·50	1·33	8·34	127·57
Mitre Square	17·23	10·33	7·27	6·03	0·97	4·37	46·20
Newgate Market	19·73	14·14	13·70	14·70	1·30	6·83	70·40
Old Jewry	18·50	15·20	7·70	13·33	0·94	4·93	60·27
St. Mary-Axe	23·47	19·93	12·57	20·74	1·13	5·53	83·37
St. Nicholas Olave Churchyard	21·03	29·17	31·87	38·36	1·20	8·10	129·73
St. Paul's Churchyard	20·60	15·20	9·47	20·80	1·10	4·10	71·27
East London Water Company	12·00	2·42	1·32	1·52	0·50	0·40	18·16
New River Water Company	11·49	1·94	1·06	2·05	0·42	0·20	17·16